

Amendments to the Claims

Listing of claims:

31 1. (Currently Amended) A composite of a vulcanizable composition selected from a group consisting of natural rubbers, synthetic rubbers and thermoplastic elastomers and having at least one metal reinforcement element embedded therein, wherein the metal reinforcement element has a coating of a polymer deposited from a solution and compatible with and co-polymerizable with said vulcanizable composition, and bearing functional groups covalently bonding to the metal surface of said reinforcement element, wherein the functional groups are ~~selected from the group consisting of:~~

~~thiol groups, mercapto groups, silanes, amines,~~

~~-SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂);~~

~~-Si(OR')₃; -Si(R'(OR')₂);~~

~~-PO₃H₂; -SO₂H;~~

~~acid anhydrides of -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -~~

~~Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂);~~

~~-PO₃H₂; -SO₂H;~~

~~acid chloride groups of -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -~~

~~SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂);~~

~~-PO₃H₂; -SO₂H;~~

~~organometallic groups of the formula -M(OR')_n -M(Cl')_n, whereby wherein M~~
is a metal selected from the group consisting of Al, Sn, B, Ti and V; and n is the
~~ligand number of ligands~~ corresponding to the metal M; and

~~a phthalocyanin, phthalonitril groups, a monothiol, or monothiolate groups;~~

~~and R' is an alkyl selected from the group consisting of methyl, ethyl or propyl.~~

2. (Original) A composite according to claim 1, wherein said solution is an aqueous solution.

3. (Original) A composite according to claim 1, wherein said solution is an alcoholic solution.

4. (Original) A composite according to claim 1, wherein said solution is an organic solution.

5. (Original) A composite according to claim 1, wherein said metal reinforcement elements have a coating of a non-cured rubber composition.

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Original) A composite according to claim 1, wherein said metal reinforcement elements comprise on top of said coating, a layer of a skim composition for the vulcanizable composition.

10. (Original) A composite according to claim 1 wherein the vulcanizable composition to be reinforced is a composition selected from the group consisting of a synthetic poly(isoprene), a natural poly(isoprene), a synthetic poly(butadiene), natural poly(butadiene), a styrene-butadiene-rubber (SBR), a halobutylrubber, and an ethylene-propylene-diene-rubber (EPDM).

11. (Original) A composite according to claim 1, wherein said metal reinforcement element is an elongated steel element.

12. (Original) A composite according to claim 11, wherein said elongated steel element is coated with at least one metallic layer.

¹⁰
~~13.~~ (Original) A composite according to claim ⁹~~12~~, wherein said metallic layer is comprised of a metal selected from the group consisting of brass, bronze, zinc, zinc alloy, tin and tin alloy.

B1
¹¹
~~14.~~ (Original) A composite according to claim ¹⁰~~13~~, wherein said zinc alloy is an alloy selected from the group consisting of a zinc-aluminium alloy, a zinc-aluminium-mischmetal alloy, a zinc-manganese alloy, a zinc-cobalt alloy, a zinc-nickel alloy, a zinc-iron alloy and a zinc-tin alloy.

┌ 15. (Canceled)

16. (Canceled)

└ 17. (Canceled)

¹²
~~18.~~ (Original) A composite according to claim 1, wherein said functional groups are carried along a polymer backbone.

¹³
~~19.~~ (Original) A composite according to claim 1, wherein said functional groups are part of side chains of the polymer.

¹⁴
~~20.~~ (Original) A composite according to claim ¹²~~18~~, wherein said functional groups are epoxy groups carried along the polymer backbone.

¹⁵
~~21.~~ (Original) A composite according to claim ¹²~~18~~, wherein said functional groups are epoxy groups which are part of side chains attached to the polymer backbone.

┌ 22. (Canceled)

└ 23. (Canceled)

16.

24. (Currently Amended) A composite of a vulcanizable composition selected from a group consisting of natural rubbers, synthetic rubbers and thermoplastic elastomers and having at least one metal reinforcement element embedded therein, wherein the metal reinforcement element has a coating of a polymer deposited from a solution and compatible with and co-polymerizable with said vulcanizable composition, and bearing functional groups covalently bonding to the metal surface of said reinforcement element, wherein the functional groups are selected from the group consisting of:

thiol groups;

SiHCl₂, -SiH₂Cl, -Si(Cl)₃, -SiHBr₂, -SiH₂Br, -SiBr₃, -Si(R'(Cl)₂), -Si(OR')₃, -Si(R'(OR')₂), wherein R' is an alkyl selected from the group consisting of methyl, ethyl, and propyl;

amines;

-PO₃H₂, -SO₂H;

the acid anhydride group of -SiHCl₂, -SiH₂Cl, -Si(Cl)₃, -SiHBr₂, -SiH₂Br, -SiBr₃, -Si(R'(Cl)₂), -Si(OR')₃, -Si(R'(OR')₂), -PO₃H₂, and -SO₂H;

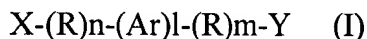
the acid chloride group of -SiHCl₂, -SiH₂Cl, -Si(Cl)₃, -SiHBr₂, -SiH₂Br, -SiBr₃, -Si(R'(Cl)₂), -Si(OR')₃, -Si(R'(OR')₂), -PO₃H₂, and -SO₂H;

phthalocyanin groups; and

phthalonitril groups;

according to claim 1, wherein the functional groups are carried as terminal groups, carried along the polymer backbone, or carried as part of side chains; and

wherein said polymer is bound to said metal surface by an adhesion promoter that is a bifunctional compound of the general formula (I)



with X representing a group capable of reacting covalently at the metal surface,

R representing an organic spacer chain,

Ar representing an ~~aromatic~~ heteroaromatic system,

Y representing a group capable of forming covalent bonds to the functional groups of said coating, and $0 \leq n, m \leq 16$, and $0 \leq l \leq 6$, and $n + m + l \neq 0$.

31
[25. (Cancelled)]

17
26. (Currently Amended) A composite according to claim 24¹⁰ wherein

X is a functional group selected from the group consisting of -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂); -COOH; -COCl; -PO₃H₂; -SO₂H; an organometallic group of the formula -M(OR')_n, whereby M is a metal selected from the group consisting of Al, Sn, B, Ti and V and n is the ~~ligand~~ number of ligands corresponding to the metal M; a phthalocyanin; a phthalonitril group; a monothiol; and a monothiolate group; R' being an alkyl;

Y is a functional group selected from the group consisting of NH₂; NHR'; NR'₂; an unsaturated residue; an acrylic acid group; a methacrylic acid group; methyl esters or ethyl esters; and

R represents -CH₂-.

[27. (Cancelled)]

18
28. (Original) A composite according to claim 26¹⁷, wherein R represents a - (CH₂)- chain; $2 \leq n \leq 20$; and said chain is unhalogenated, contains aromatic units, and includes constituents selected from the group consisting of: -(CH₂)_iCH₃ where $0 \leq i \leq 5$, -O(CH₂)_jCH₃, or -O(CF₂)_iCH₃ where $0 \leq j \leq 4$, -CN and -NH₂; -CF₂-; -CH₂-CO-NH-CH₂-; -CF₂-CO-NH-CF₂-; -CH₂-CO-NH-CF₂-; and CF₂-CO-NH-CH₂-; and where -CN is a functional group selected from the group consisting of an activated carboxylic ester; an aldehyde group; an epoxide group; -SH; -SiHCl₂; -SiH₂Cl; -Si(Cl)₃; -SiHBr₂; -SiH₂Br; -SiBr₃; -Si(R'(Cl)₂); -Si(OR')₃; -Si(R'(OR')₂); -COOH; -COCl; or a functional group capable of forming a complex with at least one ingredient of a non-metallic medium.

19
~~29.~~ (Original) A composite according to claim ~~28~~¹⁸, wherein said chain may be partially halogenated.

20
~~30.~~ (Original) A composite according to claim ~~28~~¹⁸, wherein said chain may be perhalogenated.

21
~~31.~~ (Original) A composite according to claim ~~28~~¹⁸, wherein said chain may contain thiophen units.

22
~~32.~~ (Original) A composite according to claim ~~28~~¹⁸, wherein said aromatic units may comprise constituents selected from the group consisting of: $-(CH_2)_iCH_3$ where $0 \leq i \leq 5$, $-O(CH_2)_jCH_3$, or $-O(CF_2)_iCH_3$ where $0 \leq j \leq 4$, $-CN$ and $-NH_2$; $-CF_2-$; $-CH_2-CO-NH-CH_2-$; $-CF_2-CO-NH-CF_2-$; $-CH_2-CO-NH-CF_2-$; and $CF_2-CO-NH-CH_2-$.

23
~~33.~~ (Original) A composite according to claim ~~31~~²¹, wherein said thiophen units comprise constituents selected from the group consisting of: $-(CH_2)_iCH_3$ where $0 \leq i \leq 5$, $-O(CH_2)_jCH_3$, $-O(CF_2)_iCH_3$ where $0 \leq j \leq 4$, $-CN$, $-NH_2$; $-CF_2-$; $-CH_2-CO-NH-CH_2-$; $-CF_2-CO-NH-CF_2-$; $-CH_2-CO-NH-CF_2-$; and $CF_2-CO-NH-CH_2-$.

24
~~34.~~ (Original) A composite according to claim ~~26~~¹⁷, wherein X is a functional group selected from the group consisting of the acid anhydride group of $-SH$; $-SiHCl_2$; $-SiH_2Cl$; $-Si(Cl)_3$; $-SiHBr_2$; $-SiH_2Br$; $-SiBr_3$; $-Si(R'(Cl)_2)$; $-Si(OR')_3$; $-Si(R'(OR')_2)$; $-COOH$; $-COCl$; $-PO_3H_2$, and $-SO_2H$.

25
~~35.~~ (Original) A composite according to claim ~~26~~¹⁷, wherein X is a functional group selected from the group consisting of the acid chloride group of $-SH$; $-SiHCl_2$; $-SiH_2Cl$; $-Si(Cl)_3$; $-SiHBr_2$; $-SiH_2Br$; $-SiBr_3$; $-Si(R'(Cl)_2)$; $-Si(OR')_3$; $-Si(R'(OR')_2)$; $-COOH$; $-COCl$; $-PO_3H_2$, and $-SO_2H$.

26
~~36.~~ (Original) A composite according to claim ~~26~~¹⁷, wherein R' is an alkyl selected from the group consisting of methyl, ethyl and propyl.

37. (Canceled)

²⁷

~~38.~~ (Original) A cured composition obtained by vulcanization of a composite according to claim 1.

²⁸

²⁷⁻

~~39.~~ (Original) A composition according to claim ~~38~~, wherein said composition is a pneumatic tire.

²⁹

²⁷

~~40.~~ (Original) A composition according to claim ~~38~~, wherein said composition is a hose.

³⁰

²⁷

~~41.~~ (Original) A composition according to claim ~~38~~, wherein said composition is a conveyor belt.

³¹

²⁷

~~42.~~ (Original) A composition according to claim ~~38~~, wherein said composition is a pulley belt.